

Owners Manual

Dart 8 Hook Carousel
Dart 6 Hook Carousel
Dart 4 Hook Carousel

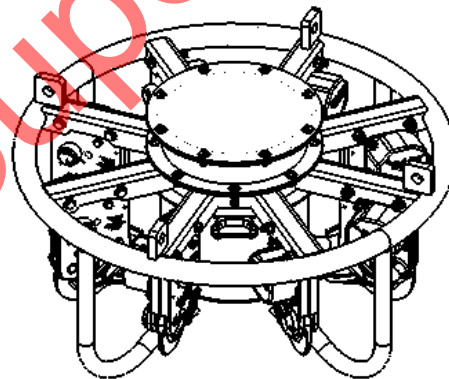


Figure 1: Dart 8 Hook Carousel (C2-8HC)



SUBJECT
OWNERS MANUAL CAROUSEL

REPORT
OM-CAROUSEL
REV. 0
11/12/14

DETAILS OF REVISIONS

REV.	DATE	PAGE	DESCRIPTION	APPROVED
0	11/12/14		Initial Release	Williamson

Superceded



SUBJECT
OWNERS MANUAL CAROUSEL

REPORT
OM-CAROUSEL
REV. 0
11/12/14

TABLE OF CONTENTS

Identification	Title	Page
SECTION 1.0:	INTRODUCTION.....	4
SECTION 2.0:	TECHNICAL INFORMATION.....	6
SECTION 3.0:	ELECTRICAL DESIGN.....	8
SECTION 4.0:	CIRCUIT SCHEMATIC.....	9
SECTION 5.0:	SAFETY FEATURES.....	9
SECTION 6.0:	LONG LINE TEST BOX.....	10
SECTION 7.0:	OPERATION.....	11
SECTION 8.0:	MAINTENANCE.....	12
SECTION 9.0:	LOAD ATTACHMENT	13
SECTION 10.0:	PARTS LIST	14

PROPRIETARY

Copyright 2014 DART Aerospace
All Rights Reserved

Page 3 of 15

1.0 INTRODUCTION

The Carousel has been designed to engage, lift, transport and release external loads off a long line cable suspended from a helicopter. The Carousel Switching System has been designed to allow the operator the ability to release a single load or all loads from a multiple load cargo system.

The Carousel utilizes C2 Remote Cargo Hooks mounted on a cage. For details on the C2 Remote Cargo Hook, refer to the C2 Remote Cargo Hook Owner's Manual.

This Carousel manual assumes the operator has purchased an entire system, which includes a Carousel, hooks, and switching system. The information contained in this manual is intended to help the operator understand the principles and requirements for operating the system properly.

WARNING:

Use only as a Long Line Hook! The Carousel is not certified as a primary or belly hook attached to the helicopter.

1.1 PRODUCT FEATURES

- The Carousel has three configurations: 8 Hook, 6 Hook, and 4 Hook.
- The solid-state design of the switching system makes it vibration or shock proof.
- The Carousel is designed for easy operation and maintenance.
- Simple installation for the aircraft. There are three leads needed to operate and power the system.
- Lights on top to indicate hook release.
- Auto dump feature to release all loads quickly and sequentially.
- Surge suppression.
- Built in safety feature to prevent the inadvertent release of a load.
- Water resistant.

1.2 PRECAUTIONS

The following precaution definitions will be used to indicate the seriousness of the hazard or condition

WARNING: May be a maintenance procedure, practice, condition, etc., which could result in personal injury or loss of life.

CAUTION: May be a maintenance procedure, practice, condition, etc., which could result in damage or destruction of equipment.

NOTE: May be a maintenance procedure, practice, condition, or a statement that needs to be highlighted.

1.3 WARRANTY

Dart Aerospace will warranty the product for workmanship for a period of 1 year. Internal components installed and manufactured from other manufactures are not covered by Dart Aerospace and are subject to OEM warranties. Dart Aerospace reserves the right to evaluate the product and determine if the unit is subject to warranty.

2.0 TECHNICAL INFORMATION

2.1.1 8 HOOK CAROUSEL

Lift Capacity: 270 lb max applied to each hook
Fully Assembled Weight: 120 lb

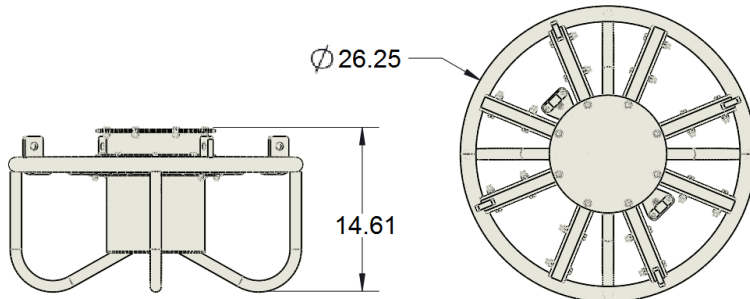


Figure 2: Side and Top View of the 8 Hook Carousel Cage (C2-8HC) shown without hooks.

2.1.2 6 HOOK CAROUSEL

Lift Capacity: 240 lb max applied to each hook
Fully Assembled Weight: 110 lb

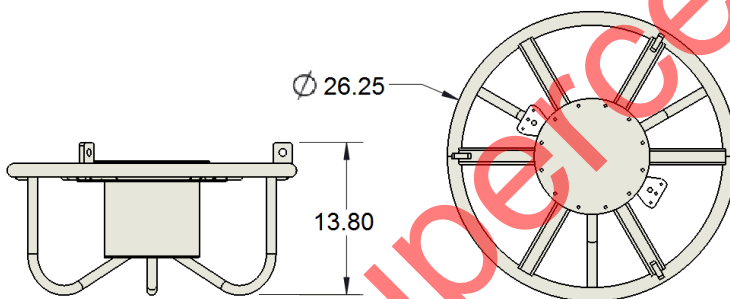


Figure 3: Side and Top View of the 6 Hook Carousel Cage (C2-6HC) shown without hooks.

2.1.3 4 HOOK CAROUSEL

Lift Capacity: 440 lb max applied to each hook
Fully assembled Weight: 100 lb

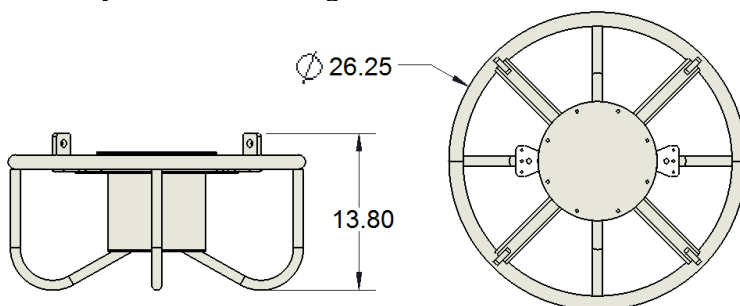


Figure 4: Side and Top View of the 4 Hook Carousel Cage (C2-4HC) shown without hooks.

2.2 SWITCHING SYSTEM

The switching system is designed to operate with the use of 24 VDC with a maximum current of 15 Amps. The switching system has been tested to release at 16 VDC with a 4 Amp draw.

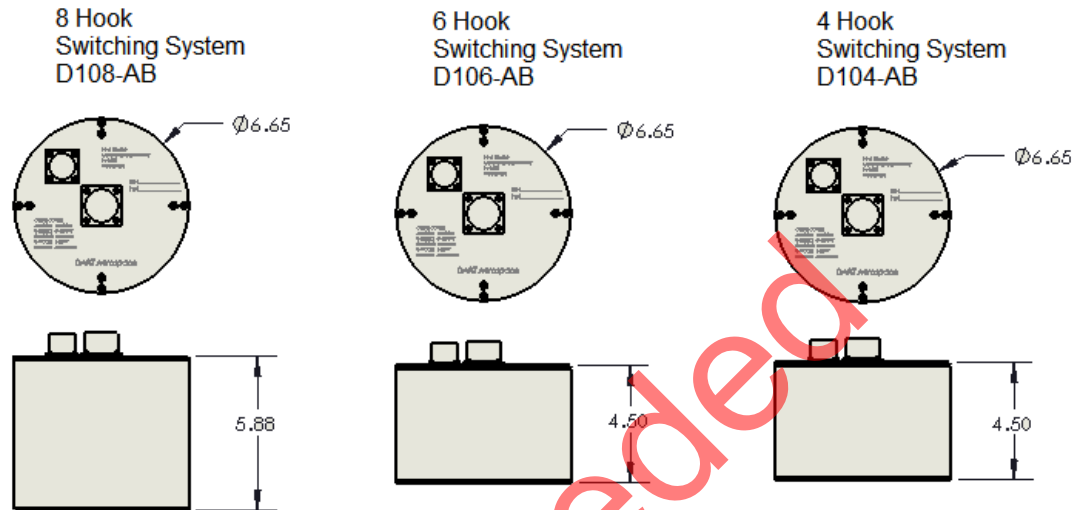


Figure 5: Dimensions for switching systems of each hook configuration.

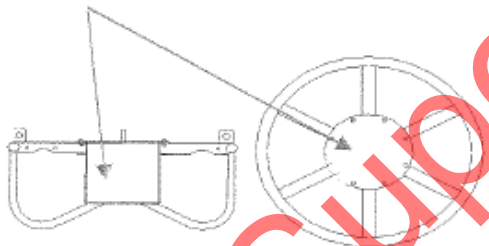


Figure 6: The switching system is housed inside the control box of the Carousel cage and securely held in place.

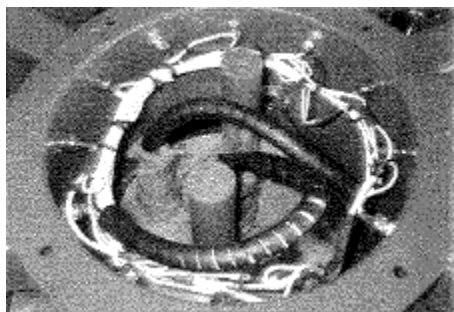


Figure 7: View of the inside of the control box with all the components wired.

3.0 ELECTRICAL DESIGN

The system is only energized when the activate/release button is activated. The switching system circuit board has been designed with the intent of not having to be constantly powered. The switching system circuit board controls the solid-state relays to trigger the lights and hooks. The system is designed to operate with the use of 24 VDC with a maximum current of 15 Amps.

3.1 HELICOPTER SIDE

To complete the circuit inside the aircraft to operate the Carousel, the operator is required to install a DPDT momentary (Mom-Off-Mom) switch (or 2 normally open SPST momentary switches) rated for 24 VDC and 20 Amps.

3.2 LONG LINE

The maximum length of line should not exceed 200 feet. Minimum 14 AWG wire must be used. A three pronged 20 Amp rated connector is required.

- Green Lead=Reset (+24VDC) / Female Plug Flat Spade (Brass Stud)
- White Lead=Activate/Release (+24VDC) / Female Plug Flat Spade (Silver Stud)
- Black Lead=Negative (0 VDC, ground) / Female Plug "U" Prong (Green Stud)

CAUTION:

BEFORE USING THE CAROUSEL, USE THE PROVIDED LONG LINE TEST BOX TO TEST FOR CORRECT POLARITY ON THE LONG LINE. See Section 6.0.

3.3 CAROUSEL

- The Carousel has a 3 prong Male connector to plug into the long line.
- The input to the switching system uses a 3 socket canon plug color coded as follows.
 - Green Lead= Reset / Canon Plug side A into system.
 - White Lead= Activate/Release / Canon Plug side B into system.
 - Black Lead= Negative / Canon Plug side C into system.
- The output from the switching system uses a 14 socket canon plug. The configuration for the output is marked on the lid of the switching system and reads as follows.
 - A=HOOK1, B=HOOK2, C=HOOK3, D=HOOK4, E=HOOK5, F=HOOK6, G=HOOK7, H=HOOK8, I=LIGHT, J=NEGATIVE
- Each hook and the lights have the positive side wired to its corresponding switching system output canon plug socket and the negative side connected to the ground terminal bolt on the inside wall of the control box.

3.4 LIGHT INDICATOR RELAY

Each hook is controlled by its own relay. Plus there is an extra relay required to trigger the lights on top of the Carousel. This relay will activate every time the release of a hook is performed. The intention of the light is to indicate to the operator that a hook has been released.

4.0 CIRCUIT SCHEMATIC

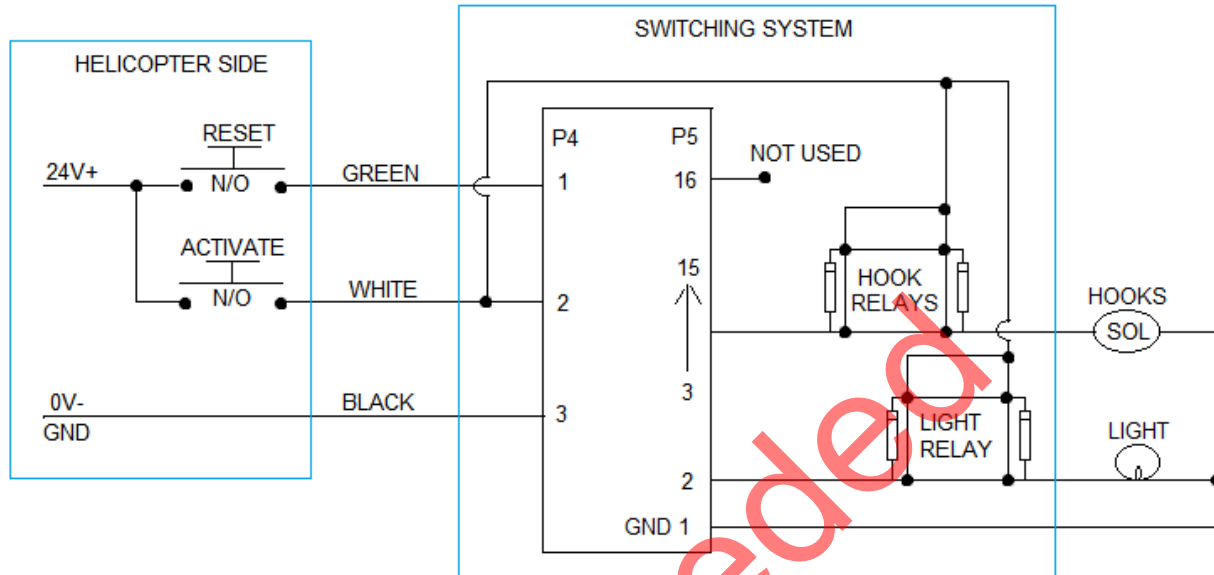


Figure 8: Carousel Circuit Schematic.

5.0 SAFETY FEATURES

Several safety features have been incorporated into the switching system and are as follows.

Delayed Release:

- The Advance/Release button needs to be activated for a minimum of one second to release a hook. This is done to prevent the inadvertent release of a load.

Reverse Polarity Protection:

- The switching system is polarity sensitive.
- Bridge diodes have been installed to protect the system.
- The system will not function if incorrect polarity is used.
- The system will function properly once correct polarity is used.
- A Long Line Test Box is provided with every Carousel to pretest each long line for correct polarity.

READ THIS PRIOR TO CAROUSEL OPERATION**6.0 LONG LINE TEST BOX**

This tester is intended to be used as part of the installation procedure for a Carousel. The tester is plugged into the electrical end of the long line prior to Carousel installation to check for proper line polarity.

There are two light indicators, one marked SW1 (switch 1) and the other marked SW2 (switch 2). Both Indicators have two possible colors that will illuminate when power is supplied to the tester. They are red and green.

A RED light indication on either switch side indicates that the circuit is not properly connected and the polarity must be changed.

A GREEN light indication on both switch sides (SW1, SW2) indicated proper wiring polarity.

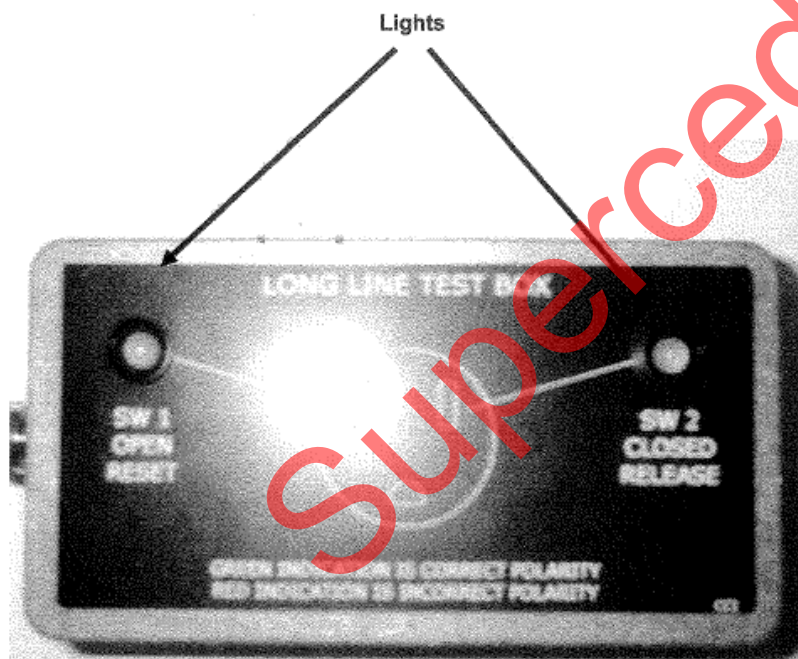


Figure 9: Long Line Test Box

7.0 OPERATION

7.1 BRIEF DESCRIPTION

A specific hook can be triggered by indexing to that hook position, then triggering the hook. The system will remain in the hook position it was last indexed to.

7.2 OPERATION OF THE ADVANCE/RELEASE AND RESET SWITCHES

- The indexing of a hook station is performed on the advance/release button. The operator will have to count the number of advance button pushes to know which hook is indexed.
- The triggering of a hook is performed on the push and one second hold of the advance/release button.
- The reset button indexes the system back to hook number one.

7.3 AUTO DUMP FEATURE

All the hooks can be released at once, sequentially. At any time during operation if the activate/release button is activated for more than 5 seconds, then all the hooks will quickly release from hook one to hook twelve.

7.4 DIFFERENT HOOK AMOUNTS

The circuit board has the ability to accommodate up to 12 hooks. The same circuit board is used for all Carousel configurations. The board will always cycle up to and including the twelfth hook. The Carousel top lights will always illuminate when the advance/release button is triggered even if it isn't being used in a twelve hook configuration.

Example:

In an eight hook configuration, there would be four ports on the board not in use. There are no relays attached to the board at those unused positions so there is nothing for the board to activate. The indexing will still take place on those positions after hook eight. Once indexed to position nine and the button is triggered, the lights on the top of the Carousel will illuminate but no hooks will be triggered.

8.0 MAINTENANCE

8.1 INSPECTION

Inspect the Carousel cage, wire rope assemblies, and the C2 Remote Cargo Hooks. Any component showing excessive wear, abuse, cracks, corrosion, or damage must be removed and replaced or repaired.

8.2 C2 REMOTE CARGO HOOK

Insure that the C2 Hook mechanism works by rotating the manual release knob while applying hand pressure to the Loadbeam. The Loadbeam should open. When the Loadbeam is then closed and latched, the manual release knob should automatically and quickly return to its closed position.

When the C2 Remote Cargo Hooks are in use, clean them daily and apply grease to the nose of the Loadbeam, where it engages the lock. The Loadbeam nose should be smooth and free of burrs or divots.

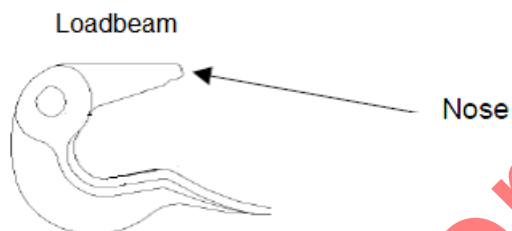


Figure 10: Loadbeam for the C2 Remote Cargo Hook.

The overhaul interval for Dart Remote Cargo Hooks is 3 years or 1500 Hrs, whichever comes first. Refer to the C2 Remote Cargo Hook Owner's Manual for detailed maintenance and overhaul procedures of the C2 Remote Cargo Hook.

8.3 SWITCHING SYSTEM REMOVAL

Removing the Carousel switching system from the control box is not recommended. However, if you need to remove the switching system:

- Start by removing the eight (or twelve) screws that hold the control box lid in place.
- The control box lid has been sealed with Pro Seal. Break the seal with a chisel and pry the control box lid off.
- Inside the control box, you will see two plugs on top of the switching system itself.
- Unscrew both plugs and fold them back out of the way.
- The switching system should now be able to be lifted out of the control box.

9.0 LOAD ATTACHMENT

9.1 LOAD RING

WARNING:
Maximum Load Ring Inner Diameter is 2.5 inches

9.2 HOOK RIGGING

When cable angle is flatter than 45°, a connector is recommended.

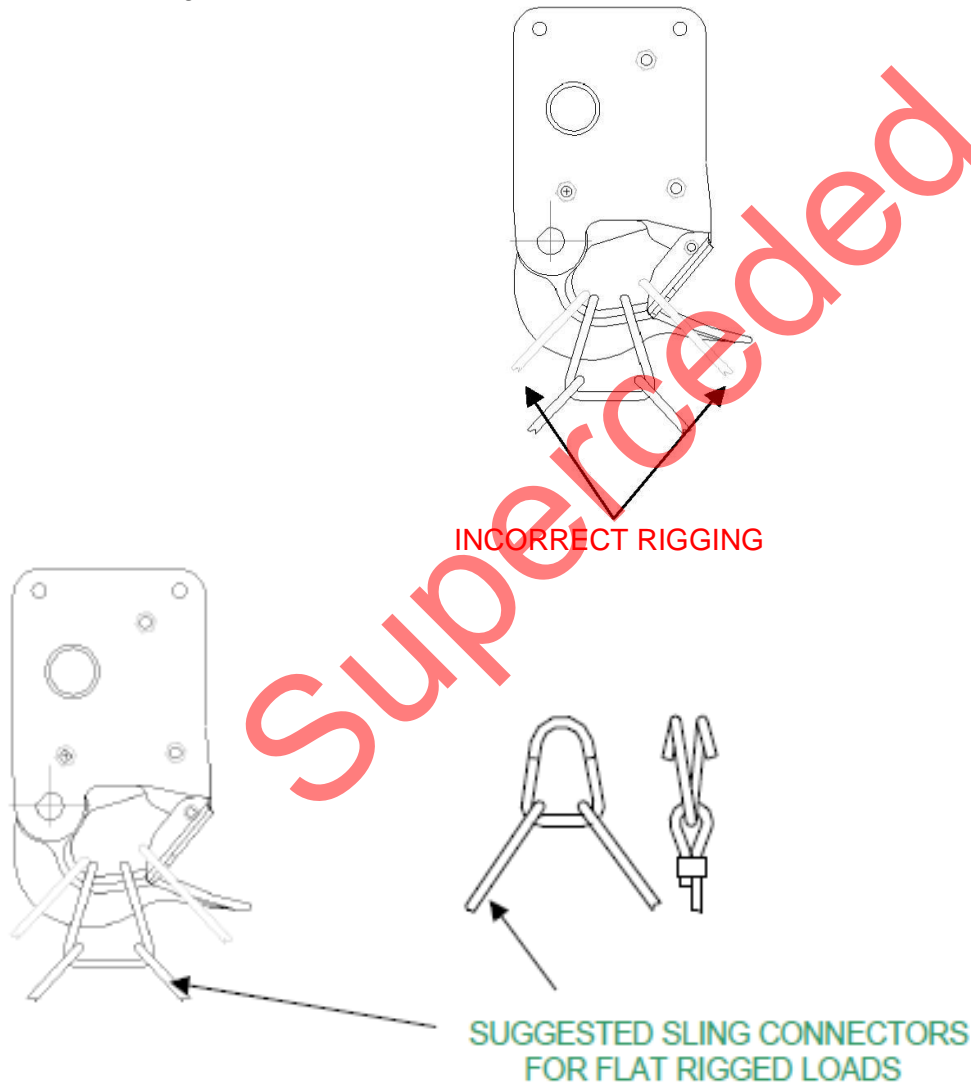


Figure 11: C2 Remote Cargo Hook correct and incorrect methods of Rigging.

10.0 PARTS LIST

10.1 PARTS LIST TABLE

Table 1: Parts list for the Carousels C2-8HC, C2-6HC, C2-4HC

PART #	DESCRIPTION	QTY C2-8HC	QTY C2-6HC	QTY C2-4HC
C2-8HC-W	Cage Weldment, 8 Hook	1	-	-
C2-6HC-W	Cage Weldment, 6 Hook	-	1	-
C2-4HC-W	Cage Weldment, 4 Hook	-	-	1
C2-8HC-WA	Adapter Weldment	1	-	-
C2-8HC-008	Lid, Control Box	1	-	1
C2-6HC-008	Lid, Control Box, 6 Hook	-	1	-
C2-8HC-29	Foam Circle	1	1	1
C2-8HC-31	Foam Rectangle	1	1	1
C2-8HC-33	Post	2	-	-
C2-6HC-33	Post	-	2	2
D108-AB	Switching System, 8 Hook	1	-	-
D106-AB	Switching System, 6 Hook	-	1	-
D104-AB	Switching System, 4 Hook	-	-	1
C2	C2 Remote Cargo Hook	8	6	4
C2-8HC-35	Hex Head Cap Screw	16	12	8
C2-8HC-37	Washer	32	24	16
C2-8HC-39	Nylon Insert Hex Nut	16	12	8
C2-8HC-41	Button Head Socket Cap Screw	16	24	16
C2-8HC-43	Washer	32	48	32
C2-8HC-45	Nylon Insert Hex Nut	16	24	16
C2-8HC-47	Light	2	2	2
C2-8HC-49	Button Head Socket Cap Screw	4	4	4
C2-8HC-51	Washer	4	4	4
C2-8HC-53	Nylon Insert Hex Nut	4	4	4
C2-8HC-55	Grommet	2	2	2
C2-8HC-57	Circular Connector	1	1	1
C2-8HC-59	Backshell, Connector	1	1	1
C2-8HC-61	Circular Connector	1	1	1
C2-8HC-63	Backshell, Connector	1	1	1
C2-8HC-65	Male Plug	1	1	1
C2-8HC-71	Ring Terminal	11	9	7
C2-8HC-73	Socket Head Cap Screw	1	2	1
C2-8HC-75	Split Lock Washer	2	4	2
C2-8HC-77	Hex Nut	2	4	2
C2-8HC-79	Cord Grip	1	1	1
C2-8HC-81	Cord Grip	10	8	6
C2-8HC-105	Wire Rope Assembly	1	-	1
C2-6HC-105	Wire Rope Assembly, 6 Hook	-	1	-

10.2 ASSEMBLY FIGURE

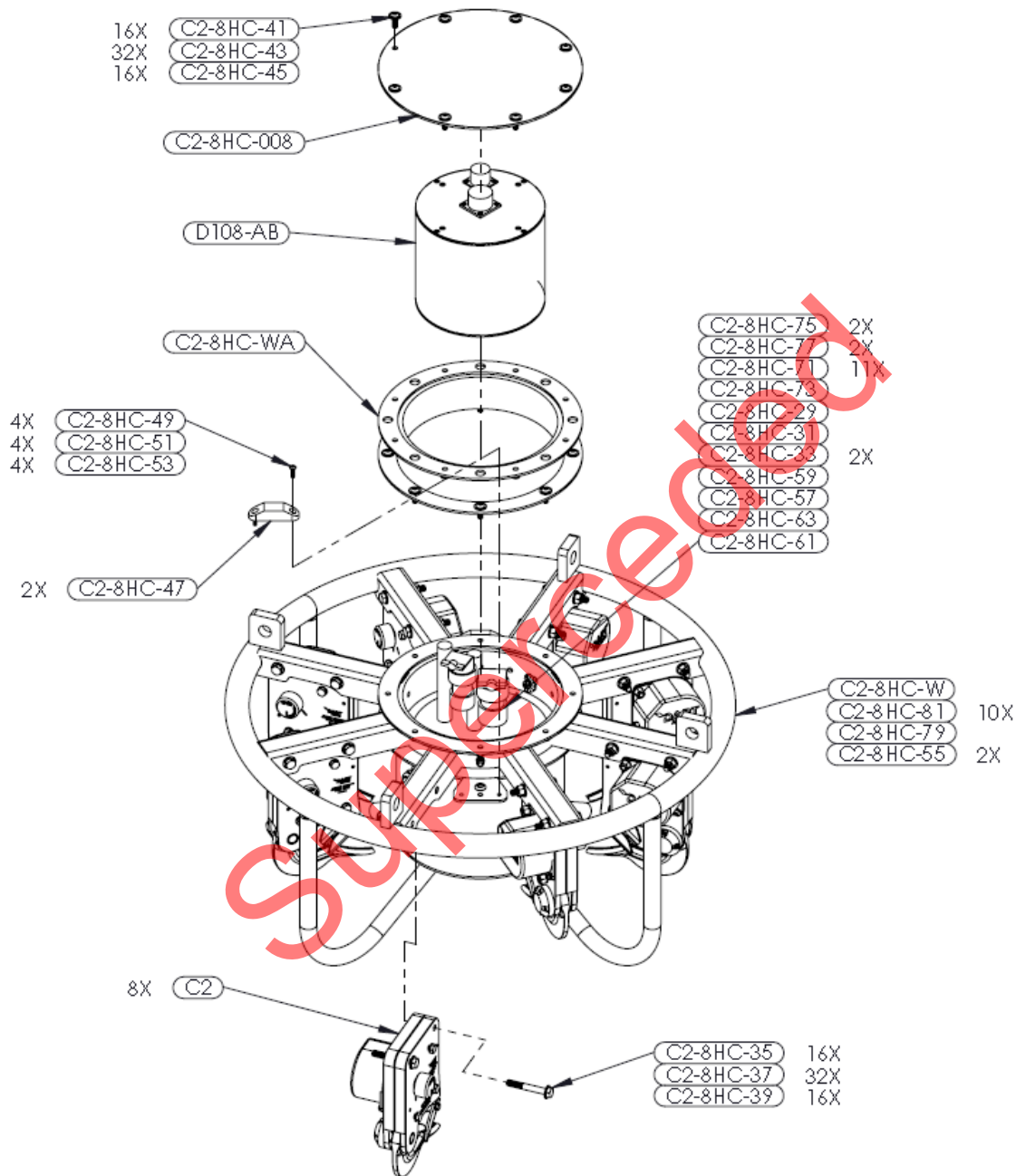


Figure 12: Exploded view of 8 Hook Carousel (C2-8HC). Check Table 1 (section 10.1) for the assembly differences between the 8 Hook and the 6 Hook and the 4 Hook Carousels.